# KINETICALLY CONTROLLED SOLDER BONDING


## Abstract

An improved method and solder composition for kinetically controlled part bonding. The method involves applying at least a first chemical element layer of an intermetallic compound to a first part and applying at least a second chemical element layer of the intermetallic compound to a second part. The first and second parts are placed together so that the chemical element layers contact each other. The parts are heated from a storage temperature to a bonding temperature which is slightly above a first melting temperature that melts the chemical element layer of one of the first and second parts into a liquid mixture. The composition of liquid mixture varies with time during heating due to the formation of the intermetallic compound therein by progressive incorporation of the other one of the first and second chemical element layers into the mixture. The melting temperature of the liquid mixture increases with time as the composition changes until the melting temperature of the liquid mixture is about equal to the bonding temperature thereby soldifying the liquid mixture into a bond. The parts are then held at a holding temperature which is higher than the storage temperature to maintain diffusion of the other one of the first and second chemical element layers into the bond. This forms a quantity of the intermetallic compound in the bond which is sufficient to raise the melting temperature of the bond to a desired usage temperature that is substantially above the first melting temperature. The intermetallic compound is typically composed of a ternary solder composition.